

## Two new species of *Turritella* (Gastropoda: Turritellidae) from western Africa

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**ABSTRACT.** *Turritella nzimaorum* sp. nov. and *Turritella wareni* sp. nov. are hereby described and illustrated. Their habitat ranges are respectively defined as from western Ghana to northern Angola and from Western Sahara to Gabon. The radula of *T. nzimaorum* sp. nov. is presented whilst the opercula of both new species are illustrated. They are compared to other, similar western African species.

### INTRODUCTION

The family Turritellidae is a relatively small family with approximately 100 recent species world-wide. About half of the extant species are endemic to various parts of Australia (Beesley et al., 1998). Most of the remaining species inhabit regions off the coasts of central America (eastern and western) and western Africa. The latter region was revised by Marche-Marchad (1960) treating 16 species and two subspecies (divided over 5 genera), and another 9 species of which the presence in that area is yet to be confirmed.

Material collected by the MNHN, Paris as well as by the first author, and examined and compared to type material previously by A. Warén (SMNH, pers. com. 2<sup>nd</sup> author, 2008), shows that currently undescribed species occur in the western African region. The research also indicates a need for a complete taxonomical revision in order to clear out issues such as subsequent references to Marche-Marchad's (1960) reference to *Turritella cochlea* Reeve, 1849 which, after examination, is described here as *Turritella wareni* sp. nov.

Furthermore, species of Turritellidae are usually quite variable and as a result many synonyms have been described throughout history. At the same time, there are several examples of good species with very restricted distribution areas.

The classification of the family is presently chaotic [Garrard (1972), Marche-Marchad (1960), Bandel (2006), and many others applied different analytical methods based on one or more characteristics] with numerous genera and subgenera often based on subtle differences in fossil species, for which there seems to be little correlation to the soft parts of living species. It is evident that further study is required to clarify

generic, as well as specific taxonomy of the Turritellidae family and, until further information is available, we uncritically use the generic name *Turritella* for all species.

### Material and Methods.

The two new species are described from specimens originating from different sources:

- *Turritella nzimaorum* sp. nov. is described from specimens collected by the first author who has dived and dredged extensively off Ghana for marine molluscan fauna over the past 30 years. Comparison is being made with a similar specimen in the collection of Christfried Schönherr (Luanda, Angola) which was collected off the coast of Luanda, Angola.
- *Turritella wareni* sp. nov. is described from specimens separated by A. Warén (SMNH) from material conserved in the MNHN, Paris and by additional material from both authors' collections and the collection of F. Swinnen (Belgium); material which was trawled off Mauritania, Western Sahara and northern Senegal.

### Abbreviations used

CCS: Collection Christfried Schönherr, Luanda, Angola.

CCV: Collection Chris Vos, Scherpenheuvel, Belgium.

CPR: Collection Peter Ryall, Maria Rain, Austria.

BMNH (and NMNH): Natural History Museum, London, UK.

MNHG: Muséum d'histoire Naturelle, Geneva, Switzerland.

MNHN: Muséum national d'Histoire naturelle, Paris, France  
 SMNH: Natural History Museum, Stockholm, Sweden  
 ZMB: Zoologisches Museum, Berlin, Germany

## SYSTEMATICS

Family *Turritellidae* Lovén, 1847  
 Subfamily *Turritellinae* Lovén, 1847  
 Genus *Turritella* Lamarek, 1799  
 Type species *Turbo terebra* Linnacus, 1758

*Turritella uzimaorum* sp. nov.  
 Figs 1 – 7; 13 – 15

**Type material.** Holotype MNHN 22608, 58.3 mm x 18.5 mm (Ex. Coll. P. Ryall).  
 Paratypes: Paratype 1: MNHN 22609, 64.1 mm x 21.7 mm (Ex. Coll. P. Ryall); paratype 2: Coll. P. Ryall, 54.0 mm x 18.5 mm; paratype 3: Coll. C. Schönherr ca. 150 mm

**Type locality.** Off Takoradi, western Ghana, on a hard rock bottom covered with fine sand/silt and rocks.

### Examined material.

- 1 shell, collected without animal, 58.3 mm x 18.5 mm, from off Takoradi, Western Ghana, ex. CPR, deposited at MNHN and designated here as holotype, coll. nr. MNHN 22608 (Figs 1, 2)
- 1 specimen, live collected, Ghana, off Adjua at ca 40 m, from canoe fishermen's net, January 1983, 64.1 mm x 21.7 mm, ex. CPR, deposited at MNHN and designated here as paratype 1; coll. nr. MNHN 22609 (not figured). Radula and operculum previously examined by A. Warén (SMNH). (Figs 13 – 15)
- 1 shell, collected without animal, CPR, white eroded shell. Collected by P. Ryall, by scuba at 20m, under rock in silt, Mudrachmi Bay, Ghana, January, 1986. 54.0 mm x 18.5 mm (ex- protoconch). Designated here as paratype 2 (Fig. 3)

- 1 shell, collected without animal, CCS, ca. 150 mm, diameter ca 50 mm, dredged at about 45 m deep, off Luanda, Angola. Designated here as paratype 3. (Fig. 4)
- 1 shell, collected without animal, CPR, adult specimen, heavy shell, apex missing, dredged at 25m on sand and rubble off Mudrachmi Bay, western Ghana, March, 1989. 66.7 mm x 23.9 mm
- 1 specimen, live collected, CPR, apex missing; Ghana, Abokwa Island, dredged on silt in 20 m, Dec. 1989, 48.9 mm x 16.6 mm
- 1 shell, collected without animal, CPR, dredged at 20m off the Volta estuary, Ghana, March, 1995, 25.4 mm x 9.7 mm (fragment: adapical whorls only, ex-protoconch, lower whorls missing)
- 3 shells, collected without animal, CPR, taken at a depth of 22 to 35 metres off Mudrachmi Bay, Ghana, 78.3 mm x 23.5 mm; 80.3 mm x 27.4 mm; 80.5 mm x 27.5 mm (Figs 5 – 7).
- 5 shells, examined visually using digital photography only, Eastern Ghana, off the Volta estuary, dredged 20 m depth, March 1995,

**Distribution range.** Currently known from western Ghana to northern Angola.

**Habitat.** In silt and sand bottom between rocks and rubble on hard substrata at depths of 15 to 50 meters.

**Dimensions.** Average size between 60 mm and 80 mm. Largest specimen examined (paratype 3, CCS) measures ca. 150 mm.

**Description.** Shell tall and broadly conical, with flat whorls. The examined specimens show that the more apical whorl is broader on the lower end than the apical diameter of the succeeding one.

Protoconch glassy, and measures approx. 0.5 – 0.7mm for one and a half whorls when the first keel appears. The adapical whorls, up to a diameter of 8-9 mm, have a sharp median keel, and a rounded suprasutural ridge. The whole surface is covered by a very fine spiral striation. On the lower whorls, the sculpture becomes coarser and more irregular and a subsutural spiral cord is added.

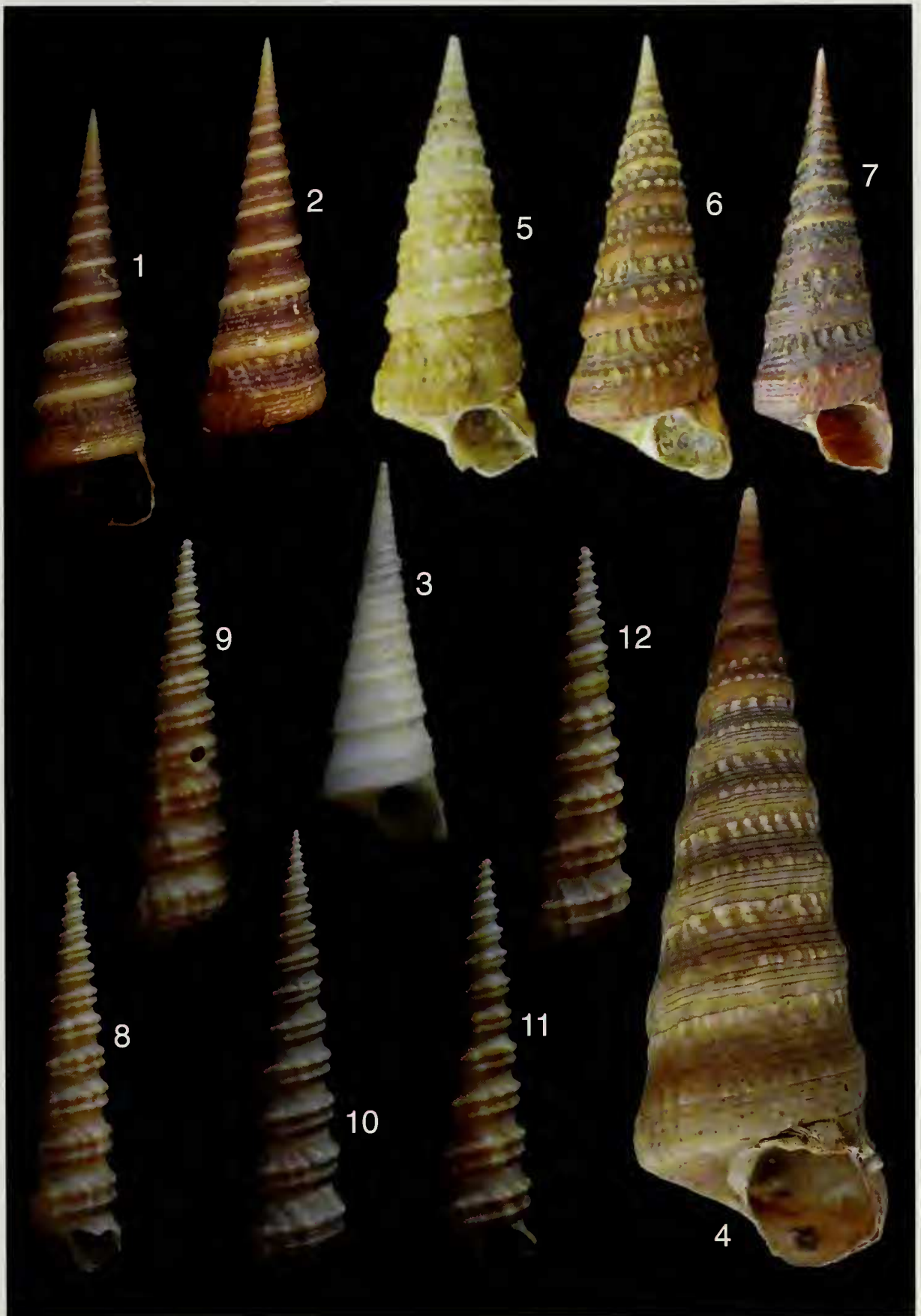
## Figures 1-12 (Figs 1-3; 8-12: Courtesy of Kenneth Vos)

### 1-7. *Turritella uzimaorum* sp. nov.

1-2. Holotype MNHN 22608, 58.3 mm x 18.5 mm, Off Takoradi, western Ghana; 3. Paratype 2: coll. P. Ryall, 54.0 mm x 18.5 mm, Mudrachmi Bay, Ghana (eroded shell); 4. Paratype 3, coll. C. Schönherr, Off Luanda, Angola, Ca 150 mm; 5-7. Colour set, coll. P. Ryall, 5. 78.3 mm x 23.5 mm; 6. 80.3 mm x 27.4 mm; 7. 80.5 mm x 27.5 mm

### 8-12 *Turritella wareni* sp. nov.

8-9. Holotype MNHN 22611, 55.8 mm x 13.7 mm, off Mauritania, 17°18'N, 16°32'W, plateau continental, N. O. N'Diogo, st. 181, 104m deep; 10. Paratype 1 MNHN 22612, 62.2 mm x 14.5 mm, off Mauritania, 18°36' N, 16°31' W, plateau continental, N. O. N'Diogo, st. 118, 96m deep; 11-12. Paratype 2 coll. C. Vos, ref. TU517, 53.8 mm x 13.2 mm, Cap Barbas, Western Sahara, Trawled by fishermen in 50-60m.



At a diameter of 10-12 mm the keels and cords become nodulous. Later on these become tubercular. At 10-15 mm diameter, 2 to 4 additional, weaker spirals appear in the concave interspaces. During this change the dominance of the two original spirals reduces. Large specimens have 2 spiral cords above the median series of knobs and 5 slightly smaller ones below. The axial sculpture consists of fine growth lines, slightly stronger than the spiral striation, with a broad embayment with its deepest part at and just above the median keel. The basal surface is flat and sharply demarcated in immature specimens, but becomes more rounded in larger, more mature specimens.

The typical colour is dark brown below the suture, becoming lighter at the base of each whorl and on the subsutural and median knobs. The protoconch is pale cream to mauve. White and pale brown specimens have been recorded suggesting some degree of colour variation (Figs 3, 5 - 7).

**Remarks.** Adult specimens are very heavy compared to all other species in this family.

**Operculum.** Dark brown, stiff, sturdily built, with more than 15 glossy whorls sculptured by weak growth lines only. The edge of the coils slightly overlap the subsequent coil. (Fig. 15).

**Radula.** taenioglossan. (Figs 13, 14). The middle row of ventral teeth and the two adjacent rows of lateral teeth are approximately of the same size and shape. Detail (Fig. 14) shows that the middle teeth have a serrated edge.

**Etymology.** Named after the indigenous Ghanaian tribe Nzima, who are predominantly fisher folk and inhabit the western region of Ghana where the species was first collected.

**Comparison.** *Turritella conspersa* Adams & Reeve, 1850 (p. 47) has a single keel on the first six whorls, but subsequent whorls bear two rounded ridges and the surface is covered with a uniform striation which is never nodulose. The operculum also differs by having a strong sculpture of obliquely radiating, incremental lines comprising of many clearly visible granules. *T. aquila* Reeve, 1849 was described from Japan and later considered a synonym of *T. conspersa* by Marche-Marchad (1960: 864). The locality range of *T. conspersa* Adams & Reeve, 1850 is north-west Africa to Guinea Bissau.

*Turritella tornulosa* Kiener, 1844, which closely resembles *T. conspersa* Adams & Reeve, 1850, has apical whorls which are less strongly keeled; at a diameter of 10 mm the whorls have 3 spiral ribs; at 15

mm 4 ribs. Its operculum has long, radiating bristles forming a continuation of the incremental ridges. It is known from Morocco to Guinea Conakry.

*Turritella gemmata* Reeve, 1849 (Holotype BMNH 1958.6.11.11), described without mention of locality, slightly resembles *T. nzimaorum* sp. nov. but its apical whorls are more convex and not as distinctly keeled; only 2-3 whorls have a single keel (*T. candida* Reeve, 1849, syntypes BMNH 1958.6.11.12-13, is a synonym). This species can be recognised by the sinuate basal part of the peristome. The operculum has a sculpture of micro tubercles forming the growth lines. *T. gemmata* Reeve, 1849 occurs from Mauritania to Angola, where it is common intertidal to a depth of 5m under rocks, often completely buried in sediment.

*Turritella meta* Reeve, 1849 was described without mention of locality, but has been associated with the west African fauna (Dautzenberg 1910: 75, Marche-Marchad 1960:867) and as a synonym of *T. gemmata* Reeve, 1849 (Gofas *et al.* 1985: 48, fig 16a). The holotype (BMNH 1904.10.28.124) however seems to be nearly identical to the western American *T. banksii* Reeve, 1849.

Reeve (1849, Pl. VII, fig. 34) mentions for *T. meta* that it is "Unacquainted to the *T. nebulosa* of M. Kiener" (Kiener, 1844, p. 33; pl. 14, fig. 2) but that he was tempted to assign this species to it, leaving reasonable doubt on the true identity of this species.

Among the fossil Turritellidae, *Turritella desmarestina* Basterot, 1825, from the Aquitanian deposits around Bordeaux is similar. It is the type species of the subgeneric name *Peyrotia* Cossmann, 1912.

*T. desmarestina* Basterot, 1825 is well known from the French and Italian Helvetian (Sacco 1895, pp 18-21) and Aquitanian (Cossmann & Peyrot, 1921) and seems to be perhaps the most voluminous *Turritella* known with a size of up to 160 x 60 mm.

#### *Turritella wareni* sp. nov.

Figs 8 - 12; 16, 17

**Type material.** Holotype: MNHN 22611, 55.80 mm x 13.76 mm.

Paratypes: Paratype 1: MNHN 22612, 62.2 mm x 14.5 mm; paratype 2: CCV ref. TU517, 53.8 mm x 13.2 mm; paratype 3: CPR, 66.4 mm; paratype 4: SMNH cat. Nbr. 6105, 46 mm.

**Type locality.** Off Mauritania, N/O N'Diogo, station 181, 17°18'N, 16°32'W, 104 m depth.

#### Figures 13-17 (courtesy of Anders Warén)

13-15. *Turritella nzimaorum* sp. nov.

13-14. Paratype 1 MNHN 22609, radula; 15. Paratype 1 MNHN 22609, operculum.

16 -17. *Turritella wareni* sp. nov. Holotype MNHN 22611, operculum



13



14



15

16



17



**Material examined.**

- 1 shell, collected without animal, from off Mauritania, 17°18'N, 16°32'W, plateau continental, N. O. N'Diago, station 181, 104m deep, B. Richer de Forges coll, 1981. Deposited at MNHN and designated here as holotype MNHN 22611, 55.8 mm x 13.7 mm (Figs 8, 9) (protoconch with holotype in separate tube). The operculum was previously examined by A. Warén but is no longer available (Figs 16, 17).
- 1 shell, collected without animal, from off Mauritania, 18°36' N, 16°31'W, plateau continental, N. O. N'Diago campagne 1981, station 118, 96m deep, Richer de Forgers-ORSTOM coll. 29/10/1981. Designated here as paratype 1 MNHN 22612. 62.2 mm x 14.5 mm (Fig. 10).
- 1 shell, collected without animal, from Cap Barbas, Western Sahara, trawled by fishermen in 50-60m, May 2001, In collection C. Vos ref. TU517 (ex-coll. Marthe Bellocq, Spain), designated here as paratype 2, 53.8 mm x 13.2 mm (Figs 11, 12).
- 3 shells, collected without animal, trawled at 50/60 m. off Western Sahara, in collection P. Ryall (ex-coll. Marthe Bellocq, Spain), 49.3 mm, 51.7 mm and 66.4 mm. The 66.4 mm specimen is designated here as paratype 3 (not figured).
- 1 shell, collected without animal, from off Cap Barbas, Western Sahara, trawled by fishermen in 50-60m, May 2001, deposited at SMNH, catalogue number 6105 (ex-collection C. Vos from coll. M. Bellocq) and designated here as paratype 4 (not figured), 46 mm.
- 1 shell, collected without animal, MNHN, Au large du Cap Blanc, Mauritania, 20° 38' N, 17° 37' W, prof. 110m, "Leon Coursin"; st. 10, 20-2-1957, coll. I. Marche-Marchad (which he labelled '*T. cochlea*', *auct.*). 29.0 mm x 7.8 mm
- 1 shell, collected without animal, MNHN, Région de Dakar (Sénégal), "Gérard Tréca", 14°49'N, 17°34'W, 150m, 7-1-1958, Coll. Marche-Marchad (which he labelled as "??*Turritella cochlea* Reeve (var ex coloré) "G.T" " (where "G. T." stands for Gérard Tréca, *auct.*). 37.7 mm x 9.8 mm
- 3 shells, collected without animal, MNHN, form off Mauritania, Plateau Continental, N/O N'Diago, st. 303 19°00'N, 16°42'W, at 120m. B. Richer de Forges coll. 1981. 20.0 mm x 5.5 mm; 9.2 mm x 2.9 mm; 6.6 mm x 2.3 mm
- 1 shell, collected without animal, MNHN, from off Mauritania, Plateau Continental, N.O. N'Diago, St. 354, 19°42'N, 17°01'W, at 98m, B. Richer de Forges coll., 1981. 43.8 mm x 11.5 mm
- 1 shell, collected without animal, MNHN, from off Gabon, Golfe de Guinée, Calypso, 1950, 0°25'N, 9°00'E, at 73m. 27.7 mm x 7.8 mm.
- 1 shell, collected without animal, MNHN, Président Th. Tissier (1936), St. 691, 20°34'N, 17°47'W, at 90m. 35.7 mm x 10.0 mm
- 1 shell, collected without animal, MNHN, from off Mauritania, Plateau Continental, N/O N'Diago, st. 173, 17°12'N, 16°32'W, 106m, B. Richer de Forges coll. 1981, 52.7 mm x 12.9 mm.
- 1 shell, collected without animal, MNHN, Région de Dakar (Sénégal), "Tenace"-dragage 2, 14°50'01"N, 17°29'03"W, at 150m, 15-3-1967, Coll. Marche-Marchad. 30.6 mm x 8.7 mm
- 1 shell, collected without animal, MNHN, from off Mauritania, Plateau Continental, N/O N'Diago, st. 176, 17°12'N, 16°41'W, 170m, B. Richer de Forges coll. 1981, 26.5 mm x 7.2 mm.
- 2 shells, collected without animal, MNHN, Région de Dakar (Sénégal), "Gérard Tréca", Dans le nord vrai des Almadies, 14°51'5"N, 17°30'W, at 165-180m, 18-02-1958. Coll. Marche-Marchad. 26.3 mm x 7.2 mm ; 27.5 mm x 7.1 mm
- 1 shell, collected without animal, MNHN, I. Marche-Marchad, 1960, Bull. I.F.A.N., t. XXII, sér. A, n° 3, p. 860, Fig. 12, Baie de Gorée. At 150m. Determined and figured by I. Marche-Marchad as *Archimediella cochlea* Reeve. 34.5 mm x 9.0 mm.
- 2 shells, collected without animal, CPR, dredged – 80 m. off Cayar, Senegal, 46.3 mm & 45.8 mm
- 1 shell, collected without animal, Coll. Frank Swinnen (Lommel, Belgium), from off Mauritania, from fishermen. 51.3 mm x 11.7 mm
- 2 shells, collected without animal, Coll. Frank Swinnen (Lommel, Belgium), from off Ad Dakhla, Western Sahara, dredged 60-80m deep, 43.9 mm x 11.2 mm; 80.5 mm x 11.6 mm

**Distribution range.** Known from Western Sahara to the Gulf of Guinea, Gabon.

**Habitat.** From the examined material it is concluded that this species lives at depths of 80 – 150 m, where it lives in sand and mud.

**Dimensions.** Average size of the examined material around 35 mm. Largest examined specimen (Coll. F. Swinnen) measures 80.5 mm.

**Description.** Shell tall, slender, strongly bicarinate, mottled with axial brownish blotches, more distinct where they cross the keels. Protoconch partly crushed in the best preserved specimen, but it seems to have consisted of 1.5 whorls. The first teleoconch whorl has a single strong keel, on the third whorl appears a much weaker spiral cord below this, plus a few still weaker spiral lines. The seventh whorl, diameter 2.0 mm, starts to appear bicarinate, with a more prominent apical keel. At the 13th whorl, the keels are of about the same size and the holotype has 20 whorls. The surface of the whorls is covered by a rather uniform sculpture of ca. 40 spiral striae, covering also the two main keels. There is also a microsculpture of about 5-8 much finer lines for each striae. The axial sculpture

consists of weak incremental lines and more scattered scars. The outer lip is shallowly sinuated with its deepest part situated between the two keels.

**Operculum.** The operculum of the holotype was examined and used for SEM photography (Figs 16, 17), though is no longer available. It had numerous coils with uneven, fringed edges partly overlapping the subsequent whorl and was sculptured with radial rows of small spines (detail Fig. 17).

**Etymology.** Named after Anders Warén, Senior Curator of Mollusca at the Swedish Museum of Natural History, Stockholm - who first drew our attention to this unnamed species - in appreciation for the enormous support and preliminary research to this description, support to the authors and in honour of his elaborate knowledge and experience with the Turritellidae family.

**Remarks.** Marche-Marchad (1958: 16; 1960: 860) used the name *T. cochlea* Reeve, 1849 for this species. The original labels show that he was unsure of the determination, as the names are mostly put between quotes.

Reeve (1849, Pl. VII, species 29; holotype and 2 paratypes in NHM, London) described *T. cochlea* without mention of locality. The name *T. cochlea* was later on correctly used by Bosch et al. (1995: 58) for a species living off eastern Arabia.

*Turritella aurocineta* Martens, 1882, (syntypes ZMB, examined from photographs) was mentioned as a synonym by Bosch et al. (1995) but has no relation to *T. cochlea* Reeve, 1849. It is considered a junior synonym of *Turritella cingulifera* Sowerby, 1825, the most common and widely distributed of the Indo-Pacific Turritellidae. *T. cochlea* Reeve, 1849 is similar to *T. wareni* sp.nov., but in addition to living in a distinctly different area, its spiral keels are already of the same size at a diameter of less than 1 mm.

*Turritella bicingulata* Lamarck, 1822 (3 syntypes in MHNG reg. no. 1097, examined on photographs) is a much more sturdy built species with a more reddish coloured shell with fewer whorls and of which the keels are much less prominent and dominating. It was described (Lamarck, 1822: 58) without mention of locality and currently considered to be restricted to the Cape Verde Islands.

The apical whorls of *T. wareni* sp. nov. show most resemblance in style to *Turritella annulata* Kiener, 1843, but that species has a less strong bicarinate shell and coarser secondary sculpture. *T. annulata* occurs from Dakar in Senegal to southern Angola (Marche-Marchad, 1960).

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#### REFERENCES

- Adams, A. & Reeve, L. A. 1850. The zoology of the voyage of H.M.S. Samarang under the command of Captain Sir Edward Belcher ... during the years 1843-1846; Reeve, Benham, and Reeve, King William Street Strand, 1848. Vol. I. [1], xxxix, [1], 358, 2, 8 p., [27] leaves of plates; Vol. II. [1], [2], 574, [2] p., [5] leaves of plates.
- Bandel, K. 2006. Families of the Cerithioidea and related superfamilies (Paleo-Caenogastropoda; mollusca) from the Triassic to the Recent characterized by protoconch morphology – including the description of new taxa. *Paläontologie, Stratigraphie, Fazies* (14), *Freiberger Forschungshefte*, C 511: 59-138.
- Beesley, P. L., Ross, G. J. B. & Wells, A. eds. 1998 [January]; *Mollusca: the southern synthesis. Fauna of Australia*, 5. Melbourne, CSIRO. Part A: xvi + 563 pp; Part B: viii + 565-1234 pp.
- Bosch, D.T., Dance, P., Moolenbeek, R. & Oliver, P.G. 1995. *Seashells of eastern Arabia*. Motivate Publishing, Dubai, 296 pp.
- Cossmann, M. & Peyrot, A. 1921. Conchologie néogénique de la Bassin de l'Aquitaine. 3. *Bulletin de la Société Linnéenne de Bordeaux* 73: pp. 1-321.
- Dautzenberg P. 1910. Contribution à la faune Malacologique de l'Afrique occidentale. *Actes Société Linnéenne de Bordeaux*, pp. 1-174.
- Garrard, T. A. 1972. A Revision of Australian Recent and Tertiary Turritellidae (Gastropoda : Mollusca). *Journal of the Malacological Society of Australia* 2(3): 267-338.
- Gofas, S., Pinto Afonso, J. & Brandao, M. 1985. *Coquillages et Mollusques d'Angola*. Universidade Agostinho Neto, Luanda, 144 pp.
- Kiener, L. C. 1844. Species général et iconographie des coquilles vivantes. Paris. 10. *Turritella*, 46 pp., 12 plates.

- Lamarck, J. B. de Monet, Chevalier de 1799. *Mémoires de la Société d'Histoire Naturelle de Paris*. Paris, Baudoin, Imprimeur du Corps législatif et de l'Institut national, place du Carrousel, n° 662, Prairial, AN VII, 171 pp., 10 pl.
- Lamarck, J. B. de Monet, Chevalier de 1822. *Histoire Naturelles des Animaux sans Vertèbres*, Tome septième, Paris, Chez l'auteur, Au jardin du Roi, Aout, 1822, De L'imprimerie de Guiraudet, Rue St.-Honoré, n°. 515, vis-à-vis St.-Roch., pp. 711.
- Marche-Marchad, I. 1958. Nouveau catalogue de la collection des mollusques testacés marins de l'I.F.A.N. *Bulletin de l'Institut Français d'Afrique Noire* Ser. A 20(14): 1-64.
- Marche-Marchad, I. 1960. Les Turritellidae de l'Afrique Occidentale (Gasteropodes Prosobranches marins). *Bulletin de l'Institut Français d'Afrique Noire* Ser. A 22: 853-883.
- Reeve, L. A. 1849. *Monograph of the genus Turritella*. *Cochologia Iconica* 5, Reeve, Benham and Reeve, King William Street Strand, London, 11 pl.